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U.S. Department of The Interior
National Biological Service

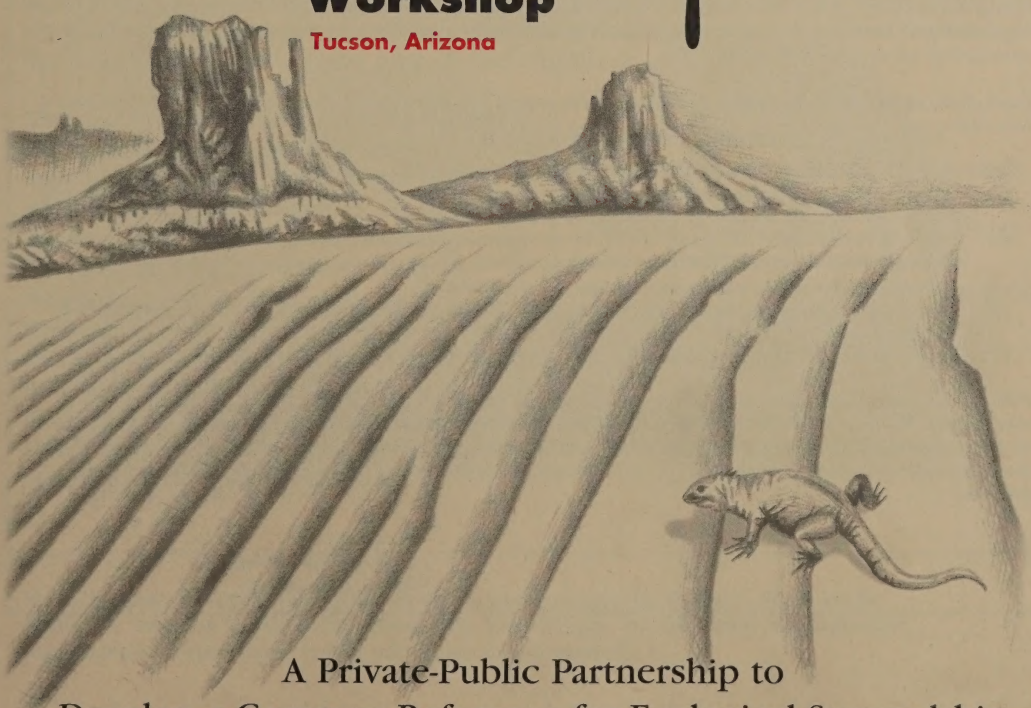
*INTERIM REPORT*

# TOWARD A SCIENTIFIC AND SOCIAL FRAMEWORK FOR ECOLOGICALLY BASED STEWARDSHIP OF FEDERAL LANDS AND WATERS

*DECEMBER 4-14, 1995*

## ECOLOGICAL STEWARDSHIP Workshop

Tucson, Arizona



A Private-Public Partnership to
Develop a Common Reference for Ecological Stewardship

# Personal Perspective

In an age of sound bites and exit polls, people and events often spawn quick and simplistic ratings. The Ecological Stewardship Workshop, inspired by Chief Thomas of the U.S. Forest Service, should not be subjected to early evaluation. *Ecosystem management*, as every resource manager knows, is a "work in progress." The 11 days in Tucson were a piece of that canvas.

We should wait at least two years to see how this event looks through political, organizational, cultural, behavioral, economic, and scientific lenses. The wait is not rooted in skepticism. The Workshop could turn out to have been a quietly significant milepost in response to American society's shifting attitude toward public lands. Alternatively, the Workshop may turn out to have been a provocative experiment, humbled by the turbulence of modern social and political change.

Whatever the end result, a few process points should be highlighted:

- For the first time, several private foundations joined the U.S. Forest Service in co-funding a federal initiative. This was a non-trivial innovation. While the collaboration was not entirely smooth, it was professional, constructive, and could portend new ways of engaging public policy choices.

- The walls between *scientists* and *resource managers* which the workshop was designed to lower or melt, remain fairly high because the incentives which drive each are different. I was fascinated to watch how much harder managers worked to understand the science than scientists worked to grasp the issues which the managers must embrace. This will be true as long as scientists are rewarded for producing good science, quite apart from how it might or might not enrich a manager's options.

- Preliminary reactions to the concept of an 11-day workshop were tortured and, in some agency quarters, predictably negative. This observer/participant saw serious professionals, hammering away during 15-hour days at the awesome challenge of integrating imperfect scientific knowledge into the tough job of managing the resource base for a public that is distinguished for the mixed signals it gives.

Since the Workshop was largely centered on **issue engagement**, the true measure of its worth will come when we see where it leads and what is **put into practice**. Seasoned agency veterans know that when management objectives shift, practice will change little until personnel incentives, internal policies, budgets, and political will are lined up behind the shift. Because the Tucson Workshop did not deal with system-level management changes — and it was arguably not the right forum — the jury will be out on this for some time. A set of markers can easily be developed to monitor changes. This task however either remains unassigned or has not been made public.

Based on discussions in Tucson, here are some things which resource management agencies understandably do not yet appear to have figured out:

(1) How to capture and integrate relevant science into management practices under declining budgets?
(2) How to embrace broader (and time-consuming) consultative processes with ecosystem "stakeholders" under declining budgets and under the strictures of Federal Advisory Committee Act?
(3) How to encourage and reward agency officers for designing and implementing experiments with field-based prototypes in *ecosystem management*? (When there are many unknowns, it is a legitimate management strategy to build knowledge on the basis of lessons from innovations and inspirations.)
(4) How to manage the natural resource base for some desired future condition when the matter of whose desired future condition has not been decided?
(5) How to more effectively embrace and enhance the role of citizens as stewards of public lands and waters?

Public resource management agencies are not into the curve of responding to a shift in society favoring natural resource sustainability. The Tucson Workshop was timely for the purpose of codifying agency advances, for inter-agency learning, and for giving standing to the scientific basis for the directions in which society is moving. Those who came to Tucson and stayed benefitted in one extraordinary and personal way — information swaps plus genuine issue engagement and discovery were daily fare.

*Theodore Smith*
*Henry P. Kendall Foundation*
*Boston, Massachusetts*

# INTRODUCTION

## Why an Ecological Stewardship Workshop?

We live in a time of historic change in the way people view, understand, and value the natural world. Not since the turn of the last century have so many varied interests in our nation had such an intense focus on the role and professional management of the public lands and their resources. The current development of an ecologically based approach to stewardship has evolved from a series of events, understandings, and articulated values provided over time by the scientific community, natural resource managers, legislative actions, judicial reviews, widespread public comment, failing rural economies, and concerns over the long-term health and viability of the environment and our ability to provide for desired goods and services from public lands.

In April 1994, Forest Service Chief Jack Ward Thomas addressed the Consultative Group on Biological Diversity, a consortium of private foundations, at a dinner meeting in Washington, D.C. In his presentation, Thomas invited the foundation community to work with the Forest Service and other federal agencies to pursue a strategy of ecosystem management — in his words "something that was part of the much broader issue of sustaining life on earth."

Thomas emphasized the need to bring together technical, social, economic, and policy considerations to form the framework for how we will use our natural resources. He also noted that the Forest Service and other federal agencies lacked several important elements to do so, including: a clear description of what implementing ecosystem management will entail and what options exist in various situations; a scientific consensus regarding the specific components of ecosystem management; and the relationship of ecosystem management to sustaining ecosystems, maintaining biological diversity, and the past, present, and future relationships of people to ecosystems.

**Participant Comment**: *"Ecosystem management is about people and for people. It is a tool for meeting people's needs for a sustainable natural system. It is a device to help us realize our very human goal of passing on to our children and theirs a world that will sustain them."*

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For information about this project contact the co-executive secretaries **Dr. Robert C. Szaro** and **Dr. William T. Sexton**, or foundation representative **Dr. Peter Stangel**. For information about individual topics contact the lead authors. Contact information listed in Appendix A.

Private foundations played a critical role in making this vision a reality. Private funds greatly accelerated the workshop planning process, and set the stage for innovative public-private partnerships that were necessary to develop a reference document. Public-private partnerships are at the core of an ecological approach. This project "lived the vision" as the private-public partnership was a major element in making the workshop a success. The critical nature of this partnership is driven by two factors. First, no one organization has all of the experience or experts needed to synthesize state-of-the-art recommendations for an ecological approach to management. Second, the most cost effective and practical way to develop an ecological stewardship reference is through Thomas' proposal — to convene a group of experts at a workshop to explore these issues and develop a common reference on how the federal agencies could implement an ecological approach, given their current resources. The expert's charge would be to develop a synthesis of the available scientific theory and data for the essential elements of an ecological approach and to develop a synthesis of the current resource management experience in implementing those elements in various field situations. He placed great importance on this workshop for helping to develop a comprehensive framework for addressing common implementation issues and strategies, for better identifying opportunities for cooperation, and for describing those elements of an ecological approach that require close collaboration of many resource management organizations. The broad partnership used to organize the workshop and provide the experts necessary to develop the desired reference documents is representative of the cooperation essential to any sound ecological approach.

Over the last 5-10 years there has been a significant evolution in the understanding of landscape relationships and resources and what constitutes the best available science and related management options. The experience and knowledge gained by federal agencies and state and private organizations has brought us to the point of being capable of consolidating a common foundation or reference to better share and more rapidly implement improved ecological approaches.

The cooperative development of this workshop by federal, state, and private partners was the key first step. The workshop launched a new era in the management of our federal lands and waters. For two weeks, over 350 land managers, ecologists, economists, sociologists, and administrators from the public and private sector worked to build a framework within which the ecological stewardship of our federal lands and waters can be implemented.

This is an interim report of some of the many concepts and issues discussed at this workshop which was held in Tucson, Arizona, December 4-14, 1995. It is neither a comprehensive nor a final report. Rather, it is intended to provide a general overview of workshop activities and to highlight some of the key ideas and challenges raised by participants. It includes summaries of discussions and personal perspectives offered by participants with different backgrounds.

For those who could attend the workshop, this report will give a sense of the participant's priorities, concerns, and ecological stewardship goals. For those who did attend, we hope this report will restore the energy and enthusiasm you exhibited during the discussions, as well as stimulate you to continue your leadership toward an ecological approach for the stewardship of federal lands and waters.

# Who Were the Workshop Sponsors?

**Sponsors List.** The Ecological Stewardship Workshop was successful because of the contributions of more people than can be named in this restricted space. Sponsors for the Ecological Stewardship Workshop included:

Private Financial Supporters

Bullitt Foundation
Hancock Timber Resources Group
Liz Claiborne & Art Ortenberg Foundation
Moriah Fund
National Fish and Wildlife Foundation
Seneca Jones Timber Company
The Henry P. Kendall Foundation
The Pew Charitable Trusts
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National Forest Foundation
National Parks and Conservation Association
Pacific Rivers Council
Pinchot Institute for Conservation
Society of American Archeology
The Nature Conservancy
University of Arizona
USDA Forest Service
USDI National Oceanic & Atmospheric Admin.
USDI Bureau of Land Management
USDI Fish and Wildlife Service
USDI Geologic Survey
USDI National Biological Service
USDI National Park Service

# How Was the Workshop Designed and Implemented?

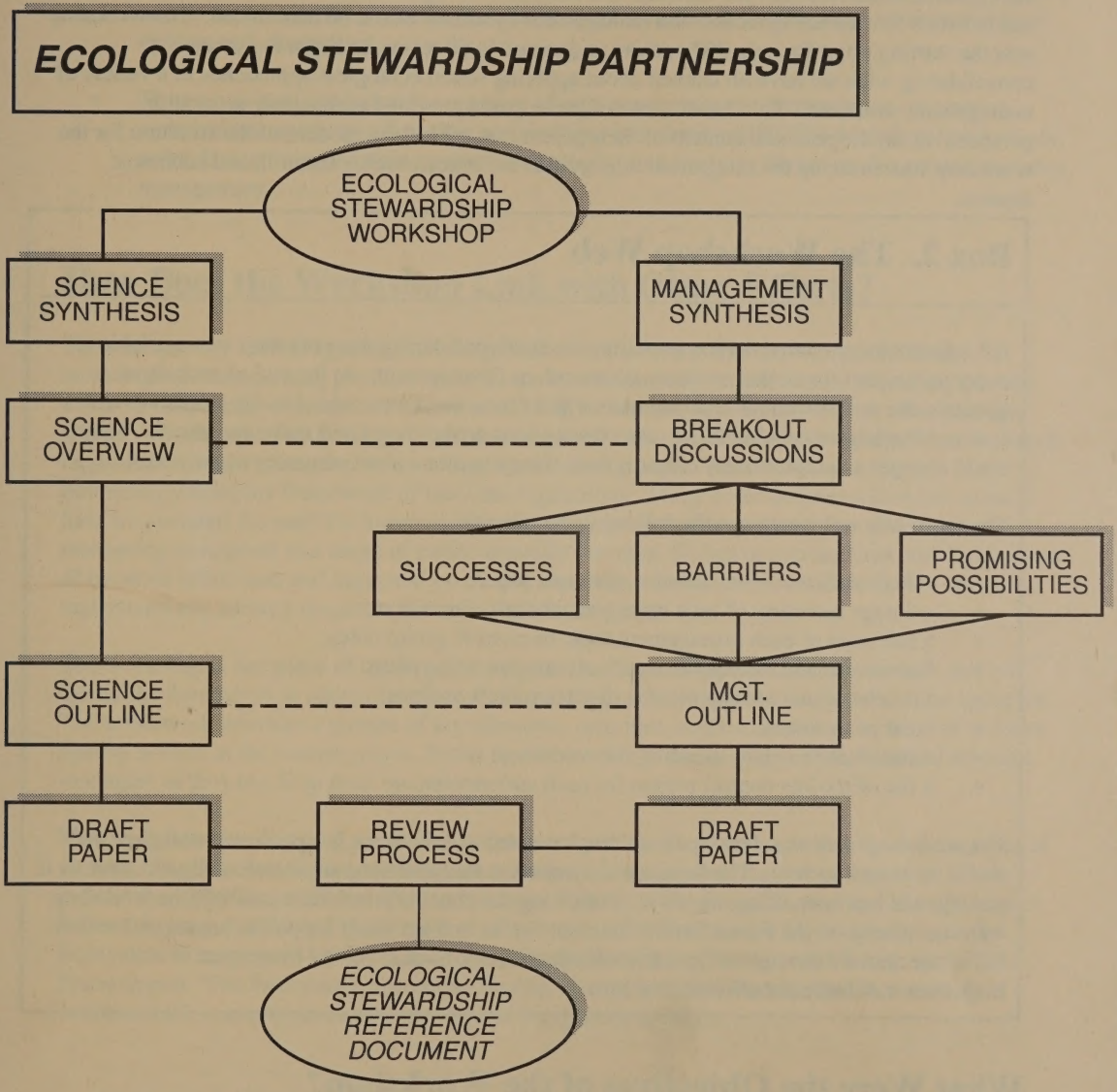
A workshop Planning Group was established with representatives from federal and state agencies, nongovernmental conservation organizations, industry, foundations, and academia. This group met in a public forum on a biweekly basis for most of the next year, and deserves tremendous credit for developing the overall approach and general structure for the workshop.

The Planning Group, after extensive discussion and public comment, selected 30 key topics related to a common vision of an ecological stewardship approach (Box 1). Two teams were developed for each topic, one to synthesize current scientific knowledge and one to synthesize current management experience in implementing that topic as a part of resource management actions (Figure 1). Both teams included scientists and managers. Their respective papers will be closely coordinated throughout the writing process.

The workshop was designed to take the current state of our scientific knowledge and eliminate the typical transition lag of 5 to 10 years historically taken to bring new knowledge into routine use in natural resource management. One key challenge was creating a stimulating workshop environment in which participants from diverse backgrounds could interact productively. In order to facilitate these interactions the workshop utilized an on-site computer network referred to as the "Workshop Web" (See Box 2). There was also a strong desire to see scientists and managers work together to achieve their respective goals. To this end, the workshop format emphasized interaction, and minimized observation. Almost everyone that attended the workshop had responsibility for a writing assignment or other activity that related to workshop goals.

## Box 1. Topics Covered at the Ecological Stewardship Workshop

1 Public Expectations/Shifting Values
2 Cultural/Social Diversity and Resource Use
3 Processes for Achieving Consensus in Achieving Land Stewardship and Sustainability
4 Regional Cooperation
5 Human Role in the Evolution of North American Ecosystems
6 Land Use Over Time
7 Shifting Human Use and Expected Demands for Natural Resources
8 Heritage Management
9 Ecosystem Sustainability and Condition
10 Ecological Restoration/Maintenance
11 Genetic and Species Diversity
12 Ecosystem and Landscape Diversity
13 Population Viability
14 Ecological Functions and Processes
15 Role of Disturbance and Temporal Dynamics
16 Scale Phenomena
17 Ecological Classification
18 Social/cultural Classification
19 Social System Functions and Processes
20 Economic interactions at local/regional/national/international scales
21 Ecological Economics
22 Producing and Using Natural Resources
23 Uncertainty and Risk Assessment
24 Evolving Public Agency Beliefs and Behaviors Toward Ecosystem-based Stewardship
25 Legal Perspectives
26 Assessments
27 Adaptive Management
28 Decision Support Systems/Models and Analyses
29 Monitoring and Evaluation
30 Data Management, Collection, and Inventory


ECOLOGICAL STEWARDSHIP PARTNERSHIP
ECOLOGICAL STEWARDSHIP WORKSHOP
SCIENCE SYNTHESIS
MANAGEMENT SYNTHESIS
SCIENCE OVERVIEW
BREAKOUT DISCUSSIONS
SUCCESSES
BARRIERS
PROMISING POSSIBILITIES
SCIENCE OUTLINE
MGT. OUTLINE
DRAFT PAPER
REVIEW PROCESS
DRAFT PAPER
ECOLOGICAL STEWARDSHIP REFERENCE DOCUMENT

At the workshop, a wide variety of disciplines, scientists, managers, and individuals from many backgrounds discussed how the essential elements of each topic could be addressed and how strong ties between the science synthesis and management synthesis would be maintained. The workshop was the starting point for over 350 authors, organized in 60 teams, to begin the process of consolidating what we have all learned about applying sound ecological approaches in a variety of management situations. This broad range of participants provided each author team with perspectives on the potential content of their papers. A critical component of the structure for the workshop was ensuring the integration of physical, biological, social, cultural, and economic aspects.

## Box 2. The Workshop Web

All information prepared for the workshop or developed during the workshop was available to every participant for further revision, comment, or development. At the end of each days sessions, the notes from those presentations and discussions were added to the workshop web system. Participants could look at other discussions groups notes and make comments. They could also get a complete copy of notes from the system or a short summary of the notes.

The workshop web contained the following documents:

- a draft version of each science synthesis paper;
- a 2 page summary of each management topic discussion;
- a full copy of each management topic discussion group notes;
- the science and management author team operating plans;
- the science and management author team draft outlines;
- a list of sponsors;
- a list of participants attending the workshop;
- a list of the key contact person for each author team.

The workshop web was developed and implemented to follow the protocols and design of the world wide web (www). The format and symbols at the workshop were essentially the same as if participants had been using the www. Following the conclusion of the workshop, the workshop web was placed on the Forest Service Internet Server and activated for public access and review. All of the above information from the workshop can be located on the Internet at: **http://www.fs.fed.us/eco/workshop.htm**

# What Were the Objectives of the Workshop?

- To develop a framework for implementation of an ecosystem approach on federal lands and waters. The framework and related information are not intended to provide prescriptive solutions for individual sites or places but should provide the foundation for the development of agency implementation plans and strategies;

- To publish a reference text that: 1) outlines the management options and alternatives for implementing an ecologically-based approach to the stewardship of federal lands and waters, and 2) documents the scientific foundations and identifies scientific shortcomings for those options and alternatives.

- To serve as the foundation for ongoing efforts: accelerating implementation, improving resource management, advancing partnerships, and sharing data. The workshop is not an end point, but rather a beginning point for improving and evolving future on-the-ground resource management.

## How Does the Workshop Link with Other Efforts?

The reasons why federal agencies came together with a common interest and vision for the workshop and its resulting products were driven by similar recent experiences. These include the evolution and general acceptance of new and modified elements of what tools a prudent manager should consider when addressing resource management options. These have emerged from research organizations, land managers, universities, and interest groups. We all operate under an increasingly complex framework of laws and regulations. Many court decisions in recent years have understated the need for improved resource management data and analyses. We all are attempting to respond to a range of public interests for more definitive explanations and descriptions of resource conditions and improved predictive capability. In addition, we all desire the ability to understand and address resources in a more holistic context.

The workshop is one piece of the larger strategy to develop a comprehensive framework and use this as the foundation to address implementation issues and strategies between and within agencies. The framework provides a picture of key elements, activities, and barriers that can be used to focus agency actions in the coming years. It can also be used by a broad range of other natural resource managers as they see fit in their operations.

This workshop was a logical step to follow previous summary efforts regarding the development of ecological approaches to land and resource management undertaken by federal agencies. These include the 1994 Congressional Research Service Report to Congress, "Ecosystem Management: Federal Agency Activities," the President's Commission for Sustainable Development, and the Ecosystem Management Initiative undertaken by the Interagency Ecosystem Management Task Force (report "The Ecosystem Approach: Healthy Ecosystems and Sustainable Economies," volumes 1&2 currently available and volume 3 expected shortly).

# WHAT COMMON THEMES EMERGED?

The workshop had two primary components. One was to closely examine and develop papers on the 30 topics. The second, recognizing that this reductionist view lacked the integration essental to an ecological approach, was to address connections across topics. The workshop looked at

"pieces," but also made a particular effort to integrate the "whole." This was accomplished throughout the workshop by a subset of the participants who were asked to step back from the intense and detailed discussions and look for the dominant themes and linkages that emerged. These individuals[1] were divided into three teams each with a slightly different charge:

(1) to summarize and describe common elements of activities that have been found to be successful in certain situations in applying the topic on the ground;

(2) to recognize and describe recurring barriers to implementation (scientific, social, economic, etc.) including a summary and description of activities that have been found to not be practical or beneficial for implementation; and,

(3) to summarize and describe common elements of activities that appear to be highly promising approaches but for which there are yet no field experience.

In this section we present brief summaries of some of the more popular, controversial, and interesting themes identified by these teams. This list is not exhaustive, but rather is intended to provide a sampling of the types of ideas raised and addressed by workshop participants. These themes should be viewed as both the foundations for additional discussions and as action items for the successful development and implementation of an ecological approach to resource management.

## Keeping Everyone "In the Loop"

It is critically important to involve key parties early in the ecosystem management planning process and keep them productively involved throughout. This seems trite, but in case after case, successful planning efforts involved key parties, while unsuccessful efforts failed to do so. Agency decision-makers should consider involving the public in non-traditional ways, such as in data collection and information assimilation. Managers also need to do more than just provide a forum for input. If necessary, they have to draw others into the process. Often, long-term residents have in-depth knowledge of how ecosystems have responded to past influences and can provide valuable guidance not available elsewhere. Decision-makers must be receptive to such input from the public and keep the decision-making process open. Some workshop participants noted that for their public interest groups, the *process* used in inviting participation is as important as the outcome.

## Sharing Information for Success

To keep key parties actively engaged in the ecological stewardship process, agency personnel must share information about the ecosystem, appropriate laws, agency management goals, the decision-making process, different stakeholders interests, and a host of other factors. It may also be

[1]Rai Bennett, Gary Benson, Gordon Brown, Jim Caplan, Bill Civish, Jerry Clark, Joan Comanor , Bob Doppelt, Chris Jauhola, Dennis LeMaster, John Mosesso, Steve Ragone, Chris Risbrudt, Rob Robinson, Peter Stangel, Brad Smith, Dick Smythe

necessary for key players to educate agency personnel about local cultures and historical traditions. This give-and-take of information contributes to each partner's education and builds the bonds necessary for effective ecological stewardship. A shared literacy and awareness about ecosystems, and about how humans rely on and affect them, can help build receptivity and support for ecological stewardship approaches.

Workshop participants noted many successful strategies for information sharing, including:

- using modern technology such as Geographic Information Systems that visually portray landscape-level concepts that are difficult to describe verbally;
- identifying agency personnel who could "speak the language," and "relate" to diverse partners. This person was often part of the local community and knew the best approach and forum for communicating information to neighbors;
- engaging professional societies, community groups, churches, and others to help with information sharing;
- committing to information sharing as a key component of ecologically based stewardship;
- providing incentives and rewards for staff that are effective educators and partnership builders.

A commitment to effective information sharing will require that agencies invest in training for key personnel and ensure that the "right" people are selected for the job. Agency people should also be part of the local community. Frequent assignment changes often disrupt linkages and trust that can only develop with time.

## Fostering a Culture of Ecological Stewardship

Social commitment exists for environmental protection, but social support for ecological stewardship can be improved. Somewhere along the way, ecosystem management got a bad name. One reason for this is the perceived negative effect of ecological stewardship on natural resource jobs. Right or wrong, that's the perception. To gain legitimacy, public ecosystem managers must tap into core public values and build social support for science and management dedicated to sustaining healthy, productive ecosystems. This effort is not about "big government." Rather, it is about looking for collaborative approaches among all landowners who desire health and productivity for the lands, waters, and resources they manage.

Society must be convinced that people are inextricably wedded to ecosystems and, therefore, humans have to take into account how they "draw" upon ecosystems for their personal well-being. An imperfect but useful analogy is how people routinely review and balance their checkbooks. They draw upon their resources to support their lifestyle choices but cannot withdraw beyond a minimum balance. We must also increase acceptance of inherent ecosystem value — the belief that

ecosystems have intrinsic value as functioning systems as well as for how their components can be used by people. In addition, this belief asserts that system components and their relationships constitute a valued and valuable asset for all species, especially humans.

On-the-ground practitioners of ecological stewardship rejected the notion that such practices tore communities apart and hurt economies. Done correctly, they viewed ecological stewardship as a way to bring communities together and improve the quality of natural resources.

## Motivated by a Love of Place

Successful approaches to ecosystem management are increasingly community-based, initiated by local people, and motivated by a "love of place." In such cases, ecosystem management is in the local interest and is a means to achieve the beneficial use of its "natural capital." There is growing realization that a long-term approach to land use and management is generally ecologically and economically better for developing harmonious and sustainable relationships between people and the land. Ecosystem management is also a means to build trusting relationships, often among former antagonists, to gain political power in furthering envisioned ends.

## Interagency Collaboration

Interagency collaboration is essential and can be improved, if people focus on each agency's relevant legislative authorities as *enabling* cooperation, rather than hindering it. Participants suggested that legislative changes to resolve statutory conflicts and enhance collaboration should be developed and presented to Congress. Positive relationships between employees in the various agencies are important to success. These relationships should be recognized and encouraged through administrative channels.

Having a shared vision for ecological stewardship is also critical for interagency collaboration The history of agency missions has led to a somewhat disjointed federal conservation mandate. However, the ground breaking efforts of workshops like this one continue to bring executive leadership teams in direct contact to discuss shared visions and objectives. Many saw the networking at staff and executive levels as a productive means to continue development of a shared vision for ecological stewardship.

Effective collaboration could also help overcome budgetary restrictions. Coordination should reduce duplication and overlap. Congress and other funding entities should respond more favorably to clearly demonstrated collaborative approaches to land management.

# Private Industry Leadership and Partnership

Partnerships that cross-cut public/private boundaries are also essential for ecological stewardship for several reasons. Awareness of private property rights was a high priority at the workshop. The notion of federal or state dominion over private lands was flatly rejected. In fact, many participants noted that private industry was providing an effective model for federal land management and industry was invited to assume the leadership role on some resource issues.

Effective collaboration between the public and private sectors will require a shared vision and strategy for implementation, mutually acceptable and binding rules for collaboration, and willingness to trust and act separately and together to attain this vision.

Shared leadership will be critical to collaboration It recognizes "co-dominance" among partners based on strengths, talents, and expertise. It recognizes the potential for "co-evolution" in personal and institutional growth and agreements. Thus, shared leadership is really "co-leadership."

Leadership means embracing complex systems by thinking in a pragmatic, work-a-day sense. Co-leadership means conscious avoidance of "I win; you lose" approaches. When such approaches are applied, progress stops. Nothing happens. We delay. We litigate. We blame. We build bureaucracy and hide behind it. We accept rigidity and reject change. We cling to structure and deny system dynamics.

**Participant Comment**: *"Ecosystem management is not about "us" or "them," but rather it transcends ownership boundaries and should be recognized as "we" resource management. All parties can contribute, and all groups need to recognize each other's contributions. The expectation should not be maps of specific ecosystems or specific prescriptions for ecosystems, but rather, we should look for the tools and framework that all land managers, regardless of ownership objectives, can use to integrate scientifically based ecosystem approaches into their programs."*

Co-leadership emerges when partners find common vision, establish agreements for how to treat one another, and contribute the resources for joint activity. In the case of federal agencies, laws (e.g., National Environmental Policy Act, Federal Land Policy and Management Act, National Forest Management Act, and Administrative Procedures Act) compel certain minimum actions. These should be used in a way that maximizes tangible and effective participation by other co-leaders.

# Hierarchical Approaches

Hierarchies are useful in ecological, economic, social, temporal, and political arenas to match the question or issue to the correct scale for analysis or decision-making. For example, in designing projects, knowledge of the characteristics and probable responses of the ecosystem are key to achieving objectives. It is useful to look one level above, to gain knowledge of context, and one level below, to gain understanding of content and processes. Theoretically, a hierarchy in the

decision-making process for ecosystem management could include the individual, family, community, county, state, region, national, and global levels.

Agencies also have administrative hierarchies. For example, the Forest Service has ranger districts, forests, regions, the Washington Office, and the Department of Agriculture. Policies and decisions must be understood in the context of the hierarchy in which they are made.

Cultural hierarchies are sometimes overlooked, but are also critically important. Local groups may differ in their risk willingness than will state or national groups. For example, a local development project may pose risk to an endangered species. Local groups may support the project, accepting the risk in favor of economic or other returns. National groups charged with the range-wide stewardship of the endangered species may not be willing to accept that same risk, given the potential impact to the species as a whole. In situations such as this, hierarchical analysis can more clearly portray the effect of decisions as multiple scales, and thereby assist with decision-making.

## Shifting Cultural Values

Values shift over time — groups should not be seen as representing the same point of view on resource issues forever. Also, the public trust is constantly being reevaluated and reliance on older stereotypes and role models may greatly delay the implementation of a more holistic approach to land management. Agencies should work to improve and share data on human demographic trends so that local managers can better track and predict changes that are likely to occur as a result of shifting cultural values. Agencies must also meet rapid cultural changes with swift and effective personnel changes and training.

## The Role of Science in Ecosystem Management

> **Participant Comment**: *"No matter how good and usable the science is, nothing of great value will result without support for and direct action by local communities. The trust and confidence required for this may take years (start now!) Only then is the science useful/usable."*

Everyone understands that good science is critical to good decision-making, but much research is not relevant to the actual managerial decisions. In particular, there is increasing need for research that simultaneously looks at structure, composition, and function at multiple scales. Since this kind of research is the most expensive to undertake, it is also becoming critical to build constituency support for scientific research. Finally, and perhaps most importantly, much controversy surrounding resource management questions is not due to the lack of science, or disagreements about the state of nature. Instead it involves basic disputes about human values. Scientists and decision-makers need to make sure these issues are clearly separated in both the research and decision-making process.

## Laws – the Good, the Bad, and the Ugly

Laws were identified both as inhibitors and as facilitators of ecologically-based stewardship. Some saw the Endangered Species Act as a motivator for change to avoid the need for difficult and costly efforts to save individual species. Others encouraged creative use of the administrative flexibility in this and other acts of Congress to demonstrate more quickly the benefits of broad authority. Narrow mandates were seen generally to hinder problem resolution, because they raised the likelihood of litigation. Many reported that when stakeholders resorted to law suits, the chances for successful ecological-based stewardship diminished sharply as stakeholders withdrew in anticipation of the courts' command and control. Others pointed out that some laws simply were not cast to solve the current problems of cross-boundary and joint ownership activities on larger landscapes. Thus, jurisdictional issues were seen as needing clarification before new cooperative activities could be undertaken wholeheartedly.

## I Need the Information.....Yesterday!

Management decisions and public education are often hampered by the lack of current information from the scientific community. This is an important issue, especially given the dynamic nature of ecological stewardship issues. Participants reiterated the need to accelerate information dissemination through informal publications (that do not entail delays of months or years for publication), computer networks, and workshops that bring together the scientific and management communities. Scientists restated the need to ensure that their work was properly peer-reviewed and implemented correctly. Continued thoughtful and up-front interaction between scientists and managers is the best approach to this challenge.

## A Society of Ecosystem Stewards

Participants suggested that a society or group specifically devoted to ecological stewardship would be appropriate and could provide the forum for effective communication and information exchange. Such a society should be non-traditional, that is, not simply involving publication of a scientific journal. Instead, such a group might be committed to bringing together the research and management communities, facilitating the sharing of successful partnerships and projects, and drawing lessons from the private sector.

## Broadening Our Horizons

Biological and biophysical scientists have a great deal to learn from interactions with social scientists, physicists, economists, and other fields not traditionally associated with "core" natural resource science. In addition, ecosystem scientists have to seek greater exposure to philosophers (for example, ethicists, theologians, and esthetists) to help describe appropriate directions for ecosystem science. Finally, ecosystem scientists need to gain insight from creative people working in fields

such as literature, drama, movies and television, or photography. Such creative fields often reveal cultural preference and concerns, and, in their own way, enable scientific ventures.

## The Only Place it Matters is On the Ground

No one at this workshop wanted to invest time in meetings, publications, or other activities that did not have a direct payoff for on-the-ground ecological stewardship. This was the underlying theme of every presentation and discussion. Clearly, the interactions between science and management authors led to a better understanding of what managers needed and what scientists could do. This sort of interaction needs to become the norm, rather than the exception. Furthermore, the on-the-ground needs of the managers should drive the research system.

## Can We Adapt?

Adaptive management, like ecosystem management, is one of those things that many people are already doing without realizing it. Participants felt, however, that "feedback loops" to provide managers with monitoring data and evaluations of their management actions were lacking in many agencies. Without this evaluation, managers have no way to assess the effectiveness of their actions and make necessary modifications. Many agencies have a history of collecting lots of data, but not of effectively using it for adaptive purposes. This was also recognized to be symptomatic of shifting agency goals. With the proper feedback loops, managers can be held accountable for their actions, and are, therefore, more likely to be responsive to local resource needs.

# WHAT ARE THE NEXT STEPS?

## Developing a Common Tool Kit

In many ways, it is useful to think of an “ecological approach” as the “tool kit” from which managers can select activities that might aid them in understanding landscapes and resources. The term ecological approach (or ecosystem management, or sustainable resource management, or several other terms) is a convention for identifying a unifying concept and related set of tools for applying the concept in a particular situation or context. Each agency, each manager, each situation might choose a different set of tools to best address concerns in any specific circumstance. In relationship to past management, an ecological approach expands the tool kit available to land managers to understand resources and the potential effects of various management strategies. While some have expressed concerns about "cookie-cutter" approaches and prescriptive solutions, our view is that a sound ecological approach inherently provides more options and more flexibility for analytical efforts to support resource managers.

Some elements of an ecological approach that need broad agency collaboration include the need to: look at larger areas as a means of understanding the context for particular resources and features on public lands; examine resources across several scales as a means of understanding relationships more thoroughly; understand process and function as a means to understand effects and long-term sustainability better; assess historical patterns and features, particularly in regard to disturbance, as a means to describe conditions, trends and historical ranges of events; discuss desired conditions across large areas as a means of communicating about and cooperating on management across jurisdictions to understand various groups' goals. These and many other key elements are addressed within the 30 topics of the workshop. In many cases, federal agencies share the need for this information and have a clear incentive, especially at broader scales, to collect and synthesize information cooperatively. We see the final reference document as a key step in defining common tasks and identifying those essential "tools" that can be developed through partnerships.

Each agency has several years of experience in developing elements of an ecological approach. None of us have a complete and totally operational package. We have all developed an improved understanding of an ecological approach over the last several years. This workshop was a beginning point in consolidating, documenting, and sharing this experience to increase the rate at which our organizations are able to apply an ecological approach in a range of situations. For example, we requested proposals for 12 case studies that would highlight the successful application of specific features of ecological stewardship. Several hundred case studies were proposed from which those at the workshop were selected. In addition, each agency has many pilot efforts, adaptive management areas, study sites, and new approaches that have been tested in field situation.

Each agency will continue to support development of the final reference document. We will also continue to cooperate in developing and applying ecological approaches while the documentation process is underway. When the final product is complete we will use that as the foundation for improving our cooperation in pursuing those tools that are common to all of our approaches.

## Draft Papers

Following the workshop, author teams are in the process of developing draft papers from the outline created at the workshop. Each author team has identified a team leader to act as a key contact. Management topic teams are extending their network of contacts and gathering information on examples for their papers. Science topic teams are continuing to develop their synthesis papers in line with discussions and information from the workshop.

## The Revision Process

Development of a final review process is underway. Contacts have been made with several science and management based organizations with significant experience in efforts similar to this project to access interest in managing the review process. The review process will continue with the strong focus on maintaining a science-management partnership through the final product. The process

itself will entail several iterations. The first will likely be undertaken by several panels which will focus on the ties between the science and management papers on each topic and the linkages between draft papers across all topics. There may be additional interim steps in the review process. The final step will be a very broad comment and review opportunity for agencies, organizations, the public, and selected peer review of individual or groups of papers. The examination and synthesis of this broad review information may be accomplished by several independent teams with a set of recommendations sent to author teams.

The first drafts of papers from author teams are due April 1, 1996. The intent is to have an agreement with an independent organization to manage the review process by that time. The steps and timing of the review process will be established with that organization.

## How Will the Final Reference Be Summarized?

**Charge**: The Summary Team[2] was charged with synthesizing each weeks varied presentations and discussions into primary themes, important questions, and follow-up activities. They will also develop a summary paper of the ecological stewardship project as a part of the final reference. The summary team consists of a political scientist, a forest scientist, a natural resource sociologist, an ecologist, a forest economist, and a wildlife biologist. During the workshop, the summary team read draft papers, attended general and breakout sessions, and met every day to discuss workshop progress and future work of the summary team.

**Goals**: The Workshop Summary Team's plan for completing their assignment of a concluding chapter, includes a commitment to:

- *synthesize the papers into a set of key findings* rather than provide a descriptive summary of workshop deliberations. The team will do a systematic review of each final science and management paper upon its completion. They will particularly look for insights that include principles and guidelines that are interagency, realistic, state-of-the-art, and provide useable knowledge,

- *provide an analysis of the historical forces* that have necessitated that we move forward with ecosystem management and that have created imperatives and opportunities to which scientists and managers must respond,

- *create a vision* to move ecosystem management into the future by making a series of proposals for change in land management, bureaucracies, law, research, and education.

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Hopefully, these proposals will have "multiplier effects" in that they will trigger further changes that encourage ecosystem management.

> **Participant Comment**: *"Don't write a concluding chapter! Rather issue a challenge in the last chapter to move us along a path of continuing evolution in our thinking about landscapes we manage. The last chapter should be a beginning not an end, It should outline* ***where to from here.***"

**Preliminary recommendations and observations**: As a result of discussions, participation, and interaction during the workshop, the Summary Team formulated a number of preliminary ideas regarding broad, strategic needs for moving ahead with implementation. In order for a wide range of partners to undertake essential activities, federal agencies should take the lead in pushing ahead. Comprehensive implementation of ecosystem management as the basis for the policies and practices guiding natural resource management on federal lands must begin immediately. The federal land management and regulatory agencies, with other public agencies and the private sector as active partners, will provide the leadership for this pervasive change in management techniques. Since ecological values, goods, and services cross public and private jurisdictional boundaries, federal agencies and their partners must continue to develop methods for including both public and private stakeholders into management decisions concerning public natural resources. The Summary Team preliminary ideas regarding broad strategic needs for moving ahead with implementation include the following recommendations:

1. Congress needs to recognize that ecosystem management involves extensive sharing of information and interactive involvement of stakeholders in the management of federal lands and waters. Therefore, federal rules and policies must be revised to provide structures with incentives to encourage open exchange of information and productive collaborative decision-making needed for ecosystem management.

   A key example of a needed revision is the Federal Advisory Committee Act (FACA) of 1972, enacted to control excessive costs, lack of openness in decision-making, and inappropriate relationships between special interests and federal agencies. The Act is so inflexible that it significantly constrains open discussion with appropriate stakeholders, does not allow for spontaneous changes in direction as agency needs develop, and its prescribed procedures are unnecessarily bureaucratic. FACA needs to be revised to encourage open and inclusive interactions and exchanges of information that are implicitly advocated in its provisions, while guarding against inappropriate behavior.

2. Federal land management agencies should initiate joint interdisciplinary research programs on ecosystem management, and conduct such research through creative partnerships among government, university, industry, state, and non-government organization scientists. An interagency working group should be established to coordinate qualitative and quantitative ecosystem management research across agencies and to recommend research priorities to the agencies, the Office of Management and Budget, and Congress.

3. Federal agencies should develop performance evaluation systems that are designed to reward employees for making measurable progress, using available science, building partnerships and coalitions, and other critical aspects of implementing ecosystem management "on-the-ground."

4. Administrators of natural resource programs and curricula should commission an independent review of the current organizational structures, incentive and reward systems for faculty, and curriculum content for all students and their learning experience. This review should recommend changes needed in research, instruction, and public service to integrate ecosystem more fully management principles and approaches.

5. There is a need for broad involvement of all potential stakeholders in the resource assessment, planning, and decision making processes. All stakeholders and participants have a responsibility to acquire an understanding of the consequences of management alternatives. They should be prepared to participate in decision-making that trades one value for another, and to reach agreements with others that may often involve compromise.

   Federal agencies, with private partners and other publics, should develop programs to assist stakeholders in being better informed regarding environmental issues at local, regional, national, and global levels.

# TEN TAKE HOME IDEAS FROM TUCSON

During the workshop a number of ideas emerged that provided some thought provoking examination of the assumptions, values, perceptions, and personal baggage each of us carries with us along during our daily routines. A number of these were proposed as little reminders to keep in your pocket and consider from time to time. Numerous participants noted that if we were as knowledgeable as we sometimes think we are, we probably would not find ourselves in the resource situations we currently face. The following are some ideas to put on the wall by your desk and from time to time, stop and think about as you deal with resource stewardship issues.

## "Nature is Dead"

Primeval, or pristine "nature" above or exclusive of human involvement is a myth with little reality. If it once existed, it exists no longer. All ecosystems are integrated with and affected by humans. People and resources are inseparable. Ecosystem science and management is forevermore about people and their relationships with the rest of nature.

## "Left Handers Are the Only People in Their Right Minds"

Intuition and creativity are as important to ecosystem science and management as the scientific method and best management practices. Creative, enabling people must be called upon to sustain healthy, productive ecosystems.

## "The First Church of Science"

Science is how we gather knowledge, not how we gain meaning. Science cannot contribute values and priorities to public decisions. Society's decisions depend on what people know and value, including what they believe expressed as religion, social conventions, and political choices.

## "Think Long-term, Act in the Moment"

Predictability is a valuable feature of science and adaptive management. We tend to act moment-by-moment, using highly reliable tools, often without considering long-term conditions and ranges of choice for future generations. At the core of our long-term beliefs and commitments is our dedication to sustaining healthy, productive ecosystems.

## "Shared Knowledge Is Power"

People used to act as if "information is power." Now we recognize that "the person who shares reliable information is powerful," gaining recognition and influence in a diverse, global context.

## "Dunk Data"

Focus on the meaning of and potential uses for data--the informational ends--its reliability, and its applicability to common data-collection agreements. Do not collect data for data collections' sake.

## "If You're Not Half Out of Control, You Can't Win the Race"

We exist within highly complex human and natural communities, influenced by chaos at every turn. We can not control anything particularly well. Yet, control and determinism are core beliefs driving much of present science and management. We must abandon control as a core belief and integrate complexity, evolution, and adaptability. We must recognize that people and societies can adapt but that we cannot definitively determine the future of ecosystems.

## "Tear the Envelope"

It is not enough simply to push the edge of the envelope. We have to find innovative, creative approaches to managing ecosystems. We must build on the past, reinterpreting past successes and failures, but not recycling past thinking.

## "Hey, It Happens"

At times, chaos spawns extreme events and what we call "natural catastrophes" or "major disturbances" occur. We cannot manage for every extreme event, and, at times, for none of them. We can manage ecosystems to build resiliency so that extreme events help sustain ecosystems and contribute to their evolution. For example, management techniques can create healthy riparian zones so that "500-year" extreme floods and soil deposition are rapidly integrated into stream systems.

## "Get Real"

Ecosystem esoterica—in the form of ecosystem science, management, and social philosophies—must be rapidly transformed into workable techniques and social values.

These are some ideas and concepts that can be used to help make the cultural shift toward ecosystem management and ecological stewardship.

# APPENDIX A
# LEAD AUTHORS

## Introductory Papers

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**The Human Ecosystem as an Organizing Concept in Ecosystem Management**

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## Topic Papers

**1 PUBLIC EXPECTATIONS/SHIFTING VALUES**

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## 2 CULTURAL/SOCIAL DIVERSITY AND RESOURCE USE

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## 3 PROCESSES FOR ACHIEVING CONSENSUS IN LAND STEWARDSHIP AND SUSTAINABILITY

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## 4 REGIONAL COOPERATION

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## 5 HUMAN ROLE IN THE EVOLUTION OF NORTH AMERICAN ECOSYSTEMS

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## 6 LAND USE OVER TIME

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Science Paper: (How Many People Can the Earth Support?)

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## 7 SHIFTING HUMAN USE AND EXPECTED DEMANDS FOR NATURAL RESOURCES

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## 9 ECOSYSTEM SUSTAINABILITY AND CONDITION

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## 28 DECISION SUPPORT SYSTEMS/MODELS AND ANALYSES

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# Summary Papers

**Integrating Social and Economic Considerations into an Ecological Approach**

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**Overall Meeting Summary and Synthesis**

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p.11 Hierarchy
p.12. Service
p.16. Sammy "Team goals
p.18. #5
p.22 #3
p. 23 #4
p. 24 #7
p. 28 #16

# NOTES

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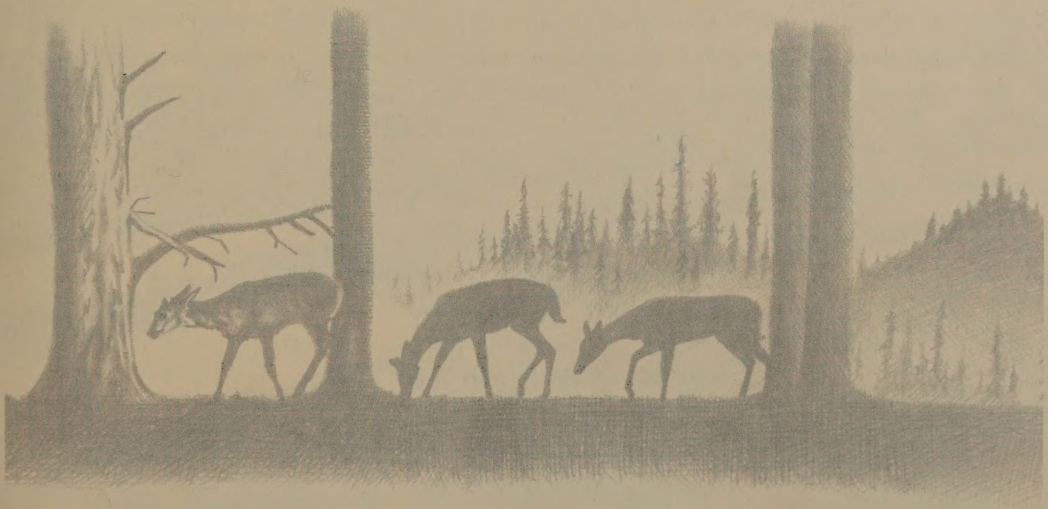

# NOTES

# Personal Perspectives

To me as a federal employee, the workshop confirmed the need to communicate across non-traditional lines – the ecological principles beg the obvious: if species and communities do not honor political boundaries, then the ecosystem approach is all but cross-boundary coordination and cooperation whether that be organizational, cultural, recreational, or professional.

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*USDI Fish and Wildlife Service, Arlington Virginia*

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The workshop succeeded in several ways. It demonstrated the depth and breadth of scientific knowledge of the federal communities and showcased numerous studies where this knowledge was being used toward improved ecosystem management. It also brought together the leadership of some of the land management agencies to hear and participate in the discussions. I applaud the efforts to accomplish such a complicated and marathon effort.

*Steven E. Ragone, President*
*S.E. Ragone & Associates, Reston, Virginia*

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One point that emerged from the workshop is that the federal government is not the only player in ecosystem management. The interest and involvement of state and private agencies, organizations, and companies displayed considerable promise and expertise in ecosystem management for the future. The recommendations of the overview team to facilitate partnerships between the federal government and other land managers in a non-regulatory, non-threatening manner will be important to meet ecosystem management goals in most landscapes across the country.

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*Boise, Idaho*

*Bill Wall, Wildlife Biologist*
*Potlach Corporation*
*Wood Products, Western Division*
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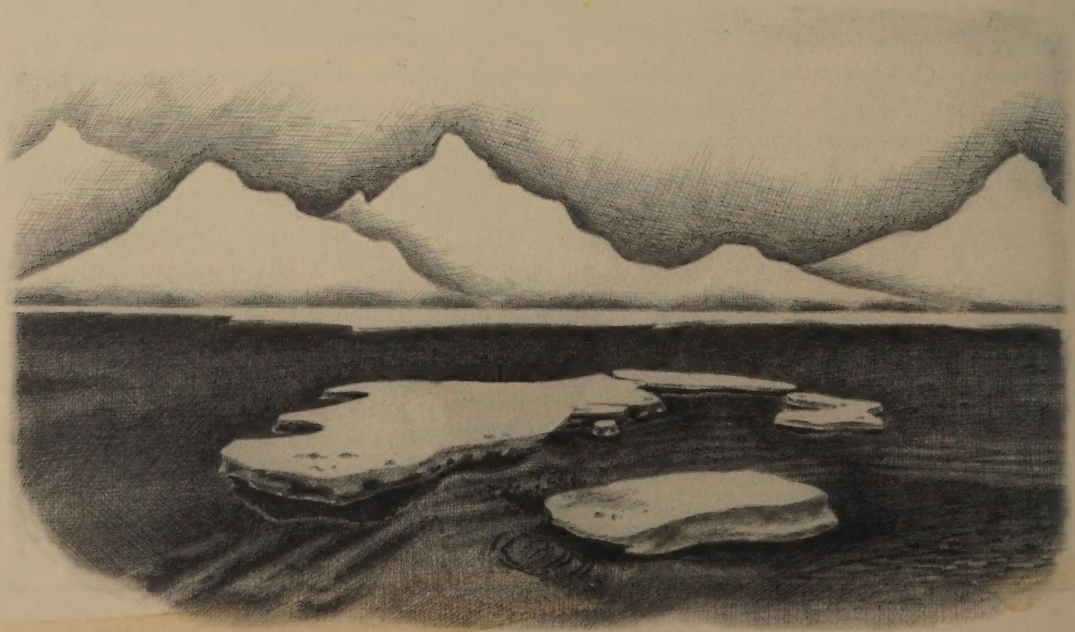
*"We abuse the land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect."*

ALDO LEOPOLD